## Content

# General

All cables must be designed to work at least under the following environmental conditions:

- Absolute maximum air temperature with a return period of 50 years (1951-2005): 40°C
- Absolute minimum air temperature with a return period of 50 years (1951-2005): -34°C
- Mean air temperature in January (1971-2000): between -8°C and +6°C
- Mean air temperature in July (1971-2000): between +6°C and +22°C
- Maximum snow cover depth with a return period of 50 years (1951-2005): 500 cm
- Maximum snow load with a return period of 50 years (1951-2005): 15KN/m²
- Maximum ice thickness: 5 - 12.5cm (depending on cable thickness)
- Mean annual wind power density at 10 m (1994-2001): max: 450W/m²
- Mean annual wind power density at 50 m (1994-2001): max. 850W/m²
- Mean annual wind speed at 10 m (1994-2001): max: 5 m/s
- Mean annual wind speed at 50 m (1994-2001): max: 5 m/s

# 4F G.657 ADSS micro with minimum 50m span in medium load

## Scope

This Specification covers the design requirements and performance standard for the supply of optical fibre cable in the industry.

| Cable type | Application |
|---|---|
| 4F ADSS micro | Self-supporting aerial installation |

## Cable Description

- Optical fibres must be housed in outer jacket and used as optical communication medium
- Water blocking aramid yarns must be used in the cable core to prevent it from water ingress • LSZH (Low smoke, Zero halogen,) outer sheath must be extruded around the cable, EU certificate for in-building installation must be provided.
- Does not need to have length signs every meter
- Maximum reel weight 50kg, optimum reel weight 25kg (can be packed in cardboxed reels).

### Quality

The supplier must ensure a stable quality control system for the cable products through several programs including ISO 9001, ISO 14001 and OHS.

### Reliability

Initial and periodic qualification tests for raw material and cable product must be performed to assure the cable's performance and durability in the field environment.

### Reference

The cable offered must be designed, manufactured and tested according to the standards as follows:

| | |
|---|---|
| ITU-T G.657 | Characteristics of a single-mode optical fibre |
| IEC 60794-1-1 | Optical fibre cables-part 1-1: Generic specification-General |
| IEC 60794-1-2 | Optical fibre cables-part 1-2: Generic specification-Basic optical cable test procedure |
| IEC 60794-3 | Optical fibre cables-part 3: Sectional specification-Outdoor cables |
| IEC 60794-3-20 | Optical fibre cables-part 3-20: Outdoor cables-Family specification for optical self-supporting aerial communication cables |

### Life Time

Optical fibre cables offered in compliance with this specification must be capable to withstand the typical service condition for a period of twenty-five (25) years without detriment to the operation characteristics of the cable.

## Optical fibres

Optical Fibres offered must meet the requirements of ITU-T G.657A1

| Parameter | Specification |
|---|---|

| | |
|---|---|
| MFD (1310nm) | 8.8±0.4□m |
| MFD (1550nm) | 9.8±0.5□m |
| Cladding diameter | 125±0.7□m |
| Fibre diameter | 245±5□m, with UV coating, and coloured to: 250±15□m |
| Core/cladding concentricity error | ≤ 0.5□m |
| Coating/cladding concentricity error | ≤ 12.0□m |
| Cladding non-circularity | ≤ 0.7% |
| Cut off wavelength | λcc ≤1260nm |
| Attenuation coefficient | 1310nm: 0.36dB/km max after cabling<br>1550nm: 0.22dB/km max after cabling |
| Bending-loss performance of optical fibres @1550nm | ≤0.25dB (10 turns around a mandrel of 30mm diameter) |
| Polarization mode dispersion maximum individual fibre | 0.1ps/km |
| Polarization mode dispersion link value | <=0,06 ps/km |
| Zero-dispersion wavelength | 1300~1324nm |
| Zero-dispersion slope | ≤0.092ps/nm$^2$·km |

## Optical Cable

### Technical Characteristics

- High-integrated coloured bare fibre design
- Aramid yarn as strength member making cable have excellent tensile strength performance • The outer jacket material has many advantages such as anti-corrosion, waterproof, antiultraviolet radiation, flame-retardant and harmless to environment etc.

### Dimensions and Descriptions

| **Items** | **Contents** | **Descriptions** |
|---|---|---|
| Optical Fibre | Counts | 4 |
| | Fibre Type | ITU-T G.657A1 |
| Strength Member | Material | Water blocking aramid yarns |
| Outer Sheath | Material | HDPE, LSZH, UV resistant |
| | Colour Code | Black |
| | Thickness(mm) | 0.75 |
| Cable Diameter(mm) Approx. | | =<3.2mm |

| | |
|---|---|
| Cable Weight(kg/km) Approx. | 13 |

## Mechanical and Environmental Performance

| **Span(M)** | **Tensile performance(N)** | | **Crush(N/100mm)** |
|---|---|---|---|
| | Short term | Long term | Short term |
| 50 | 750 | 250 | 50 |

## Environmental and installation condition

| Max. wind speed | Max. ice thickness | Initial Installation sag | Temperature |
|---|---|---|---|
| 27.07 | 0 | 1 | -40~+70℃ |

| | |
|---|---|
| Operation temperature | -25℃ ~ +60℃ |
| Installation temperature | -10℃ ~ +50℃ |
| Storage & transportation temperature | -30℃ ~ + 60℃ |

## Mechanical, Physical and Environmental Test Characteristics

The mechanical and environmental performance of the cable must be in accordance with the following table. Unless otherwise specified, all attenuation measurements required in this section shall be performed at 1550nm.

| **Item** | **Test Method** | **Requirements** |
|---|---|---|
| **Tension** | **IEC 60794-1-2-E1**<br>Load: According to 3.5<br>Sample length: Not less than 25m.<br>Duration time: 1min. | Additional attenuation: ≤0.4B after test No damage to outer jacket |
| **Crush** | **IEC 60794-1-2-E3**<br>Load: According to 3.5<br>Duration of load: 1min | Additional attenuation: ≤0.4B after test No damage to outer jacket |
| **Impact** | **IEC 60794-1-2-E4**<br>Radius: 300mm<br>Impact energy: 1<br>Impact number: 1<br>Impact points:3 | Additional attenuation: ≤0.4B No damage to outer jacket |
| **Bend** | **IEC 60794-1-2-E11A**<br>Mandrel radius:10*D<br>Turns: 5<br>Cycles: 5 | Additional attenuation: ≤0.4B No damage to outer jacket |
| **Repeated bending** | **IEC 60794-1-2-E6**<br>Bending radius: 20*D<br>Cycles: 30<br>Load: 20 | Additional attenuation: ≤0.4B No damage to outer jacket |

| | | |
|---|---|---|
| **Torsion** | **IEC 60794-1-2-E7**<br>Cycles:10<br>Length under test: 1m<br>Turns: □ 180°<br>Load: 20 | Additional attenuation: ≤0.4B No damage to outer jacket |
| **Temperature cycling** | **IEC 60794-1-2-F1**<br>Sample length: at least 1000m<br>Temperature range:<br>-40→+70℃<br>Cycles: 2<br>Temperature cycling test dwell time: 8hours | The change in attenuation coefficient shall be less than 0.1dB/km at 1550nm. |
| **Water Penetration** | **IEC 60794-1-2-F5B**<br>Time: 24 hours<br>Sample length: 3m<br>Water height: 1m | No water leakage. |
| **Other parameters** | According to **IEC 60794 -1** | |

# 12F G.657 ADSS mini with minimum 50m span in medium load

## Scope

This Specification covers the design requirements and performance standard for the supply of optical fibre cable in the industry. A stable quality control system for the cable products through several programs including ISO 9001, ISO 14001 and OHS must be ensured.

| Cable type | Application |
|---|---|
| ADSS 50m 12F | Self-supporting aerial installation |

## Reference

The cable offered must be designed, manufactured and tested according to the standards as follows:

| | |
|---|---|
| ITU-T G.657A1 | Characteristics of a single-mode optical fibre |
| IEC 60794-1-1 | Optical fibre cables-part 1-1: Generic specification-General |
| IEC 60794-1-2 | Optical fibre cables-part 1-2: Generic specification-Basic optical cable test procedure |
| IEC 60794-3 | Optical fibre cables-part 3: Sectional specification-Outdoor cables |
| IEC 60794-4-20 | Aerial optical cables along electrical power lines – Family specification for ADSS (All Dielectric Self Supported) optical cables |

## Life Time

Optical fibre cables offered in compliance with these specifications must be capable to withstand the typical service condition for a period of twenty-five (25) years without detriment to the operation characteristics of the cable.

## Application

| Item | Value |
|---|---|
| **Max. pole distance** | 50m |
| **Operation temperature** | -20 ºC～+70 ºC |
| **Storage temperature** | -20 ºC～+70 ºC |
| **Static bending radius** | 10 times the cable diameter |
| **Dynamic bending radius** | 20 times the cable diameter |

## Optical Fibre

Optical Fibres offered must meet the requirements of ITU-T G.657A1

| Parameter | Specification |
|---|---|
| MFD (1310nm) | 8.8±0.4□m |
| MFD (1550nm) | 9.8±0.5□m |
| Cladding diameter | 125±0.7□m |
| Fibre diameter | 245±5□m, with UV coating, and coloured to: 250±15□m |
| Core/cladding concentricity error | ≤ 0.5□m |
| Coating/cladding concentricity error | ≤ 12.0□m |
| Cladding non-circularity | ≤ 0.7% |
| Cut off wavelength | λcc ≤1260nm |
| Attenuation coefficient | 1310nm: 0.36dB/km max after cabling<br>1550nm: 0.22dB/km max after cabling |
| Bending-loss performance of optical fibres @1550nm | ≤0.25dB (10 turns around a mandrel of 30mm diameter) |
| Polarization mode dispersion maximum individual fibre | <=0.1ps/√km |
| Polarization mode dispersion link value | <= 0,06ps/√km |
| Zero-dispersion wavelength | 1300~1324nm |
| Zero-dispersion slope | ≤0.092ps/nm$^2$·km |

## Optical Cable

### Technical Characteristics

- The second coating and stranding technology provide the fibres with enough space and bending endurance, which ensure good optical property of the fibres in the cable

- Accurate process control ensures good mechanical and temperature performance
- High quality raw material guarantees the long service life of cable

## Dimensions and Descriptions

The standard optical cable structure is shown in the following table:

| Item | Contents | Value |
|---|---|---|
| | | 12 |
| Structure | Type | 1+5 |
| Loose tube or central tube | Fibre count/tube | 12 |
| | Outer diameter (mm) | 2,4 |
| Central strength member | Material | FRP |
| | Diameter (mm) | 1,8 |
| | PE layer diameter (mm) | - |
| Water blocking | Material | Water blocking yarn & tape |
| Peripheral strength member | Material | Aramid yarn |
| Sheath | Material | HDPE |
| | Colour | Black |
| | Thickness (mm) | Nominal: 1.5 |
| Ripcord | Number | 2 |
| Cable diameter(mm) MAXIMUM Approx. | | 7 |
| Cable weight(kg/km) MAXIMUM Approx. | | 75 |

## Mechanical Performance

Main mechanical performance

| Item | Max allowable tension(N) | Fibre strain (%) | Crush(N/100mm) | |
|---|---|---|---|---|
| | | | Short term | Long term |
| 12 | 2500 | □0.6 | 1500 | 750 |
| | 1800 | □0.33 | 1500 | 750 |

## Environmental performance and installation condition

| Max. wind speed | Max. ice thickness | Initial Installation sag | Temperature |
|---|---|---|---|
| 17.5m/s | 6.5mm | 1.5% | -40 ºC～+70 ºC |

## Mechanical, Physical and Environmental Test Characteristics

The mechanical and environmental performance of the cable must be in accordance with the following table. Unless otherwise specified, all attenuation measurements required in this section shall be performed at 1550nm.

| Items | Test Method | Requirements |
|---|---|---|
| **Tension** | **IEC 60794-1-2-E1**<br>Load: According to 3.5<br>Sample length: Not less than 50m.<br>Duration time: 1min. | Additional attenuation: ≤0.05dB after test<br>No damage to outer jacket and inner elements |
| **Crush** | **IEC 60794-1-2-E3**<br>Load: According to 3.5<br>Duration of load: 1min | Additional attenuation: ≤0.05dB after test<br>No damage to outer jacket and inner elements |
| **Impact** | **IEC 60794-1-2-E4**<br>Radius: 300 mm<br>Impact energy: 10 J<br>Impact number: 1<br>Impact points: 3 | Additional attenuation: ≤0.1dB<br>No damage to outer jacket and inner elements |
| **Repeated bending** | **IEC 60794-1-2-E6**<br>Bending radius: 20*D<br>Cycles: 25<br>Load: 150N | Additional attenuation: ≤0.05dB<br>No damage to outer jacket and inner elements |
| **Torsion** | **IEC 60794-1-2-E7**<br>Cycles:10<br>Length under test: 1m<br>Turns: □ 180°<br>Load: 150N | Additional attenuation: ≤0.1dB<br>No damage to outer jacket and inner elements |
| **Water Penetration** | **IEC 60794-1-2-F5B**<br>Time: 24 hours<br>Sample length: 3m<br>Water height: 1m | No water leakage. |
| **Temperature cycling** | **IEC 60794-1-2-F1**<br>Sample length: at least 1000m<br>Temperature range: -40 ºC ~+70 ºC<br>Cycles: 2<br>Temperature cycling test dwell time: 12 hours | The change in attenuation coefficient shall be less than 0.05 dB/km. |
| **Other parameters** | According to **IEC 60794-1** | |

## 24F G.657 ADSS mini with minimum 50m span in medium load

## Scope

This Specification covers the design requirements and performance standard for the supply of optical fibre cable in the industry. A stable quality control system for the cable products through several programs including ISO 9001, ISO 14001 and OHS must be ensured.

| Cable type | Application |
|---|---|
| ADSS 50m 24F | Self-supporting aerial installation |

## Reference

The cable offered must be designed, manufactured and tested according to the standards as follows:

| | |
|---|---|
| ITU-T G.657A1 | Characteristics of a single-mode optical fibre |
| IEC 60794-1-1 | Optical fibre cables-part 1-1: Generic specification-General |
| IEC 60794-1-2 | Optical fibre cables-part 1-2: Generic specification-Basic optical cable test procedure |
| IEC 60794-3 | Optical fibre cables-part 3: Sectional specification-Outdoor cables |
| IEC 60794-4-20 | Aerial optical cables along electrical power lines – Family specification for ADSS (All Dielectric Self Supported) optical cables |

## Life Time

Optical fibre cables offered in compliance with these specifications must be capable to withstand the typical service condition for a period of twenty-five (25) years without detriment to the operation characteristics of the cable.

## Application

| Item | Value |
|---|---|
| **Max. pole distance** | 50m |
| **Operation temperature** | -20 ºC～+70 ºC |
| **Storage temperature** | -20 ºC～+70 ºC |
| **Static bending radius** | 10 times the cable diameter |
| **Dynamic bending radius** | 20 times the cable diameter |

## Optical Fibre

Optical Fibres offered must meet the requirements of ITU-T G.657A1

| Parameter | Specification |
|---|---|
| MFD (1310nm) | 8.8±0.4□m |
| MFD (1550nm) | 9.8±0.5□m |
| Cladding diameter | 125±0.7□m |
| Fibre diameter | 245±5□m, with UV coating, and coloured to: 250±15□m |

| | |
|---|---|
| Core/cladding concentricity error | ≤ 0.5□m |
| Coating/cladding concentricity error | ≤ 12.0□m |
| Cladding non-circularity | ≤ 0.7% |
| Cut off wavelength | λcc ≤1260nm |
| Attenuation coefficient | 1310nm: 0.36dB/km max after cabling<br>1550nm: 0.22dB/km max after cabling |
| Bending-loss performance of optical fibres @1550nm | ≤0.25dB (10 turns around a mandrel of 30mm diameter) |
| Polarization mode dispersion maximum individual fibre | <=0.1ps/√km |
| Polarization mode dispersion link value | <= 0,06ps/√km |
| Zero-dispersion wavelength | 1300~1324nm |
| Zero-dispersion slope | ≤0.092ps/nm$^2$·km |

# Optical Cable

## Technical Characteristics

- The second coating and stranding technology provide the fibres with enough space and bending endurance, which ensure good optical property of the fibres in the cable
- Accurate process control ensures good mechanical and temperature performance
- High quality raw material guarantees the long service life of cable

## Dimensions and Descriptions

The standard optical cable structure is shown in the following table:

| **Item** | **Contents** | **Value** |
|---|---|---|
| | | **24** |
| Structure | Type | 1+5 |
| Loose tube or central tube | Fibre count/tube | 12 |
| | Outer diameter (mm) | 2,4 |
| Central strength member | Material | FRP |
| | Diameter (mm) | 1,8 |
| | PE layer diameter (mm) | - |
| Water blocking | Material | Water blocking yarn & tape |

| | | |
|---|---|---|
| Peripheral strength member | Material | Aramid yarn |
| Sheath | Material | HDPE |
| | Colour | Black |
| | Thickness (mm) | Nominal: 1.5 |
| Ripcord | Number | 2 |
| Cable diameter(mm) MAXIMUM Approx. | | 7 |
| Cable weight(kg/km) MAXIMUM Approx. | | 75 |

## Mechanical Performance

Main mechanical performance

| Item | Max allowable tension(N) | Fibre strain (%) | Crush(N/100mm) | |
|---|---|---|---|---|
| | | | Short term | Long term |
| 12 | 2500 | □0.6 | 1500 | 750 |
| | 1800 | □0.33 | 1500 | 750 |

## Environmental performance and installation condition

| Max. wind speed | Max. ice thickness | Initial Installation sag | Temperature |
|---|---|---|---|
| 17.5m/s | 6.5mm | 1.5% | -40 ºC～+70 ºC |

## Mechanical, Physical and Environmental Test Characteristics

The mechanical and environmental performance of the cable must be in accordance with the following table. Unless otherwise specified, all attenuation measurements required in this section shall be performed at 1550nm.

| Items | Test Method | Requirements |
|---|---|---|
| **Tension** | **IEC 60794-1-2-E1**<br>Load: According to 3.5<br>Sample length: Not less than 50m.<br>Duration time: 1min. | Additional attenuation: ≤0.05dB after test<br>No damage to outer jacket and inner elements |
| **Crush** | **IEC 60794-1-2-E3**<br>Load: According to 3.5<br>Duration of load: 1min | Additional attenuation: ≤0.05dB after test<br>No damage to outer jacket and inner elements |
| **Impact** | **IEC 60794-1-2-E4**<br>Radius: 300 mm<br>Impact energy: 10 J<br>Impact number: 1<br>Impact points: 3 | Additional attenuation: ≤0.1dB<br>No damage to outer jacket and inner elements |

| | | |
|---|---|---|
| **Repeated bending** | **IEC 60794-1-2-E6**<br>Bending radius: 20*D<br>Cycles: 25<br>Load: 150N | Additional attenuation: ≤0.05dB<br>No damage to outer jacket and inner elements |
| **Torsion** | **IEC 60794-1-2-E7**<br>Cycles:10<br>Length under test: 1m<br>Turns: □ 180°<br>Load: 150N | Additional attenuation: ≤0.1dB<br>No damage to outer jacket and inner elements |
| **Water Penetration** | **IEC 60794-1-2-F5B**<br>Time: 24 hours<br>Sample length: 3m<br>Water height: 1m | No water leakage. |
| **Temperature cycling** | **IEC 60794-1-2-F1**<br>Sample length: at least 1000m<br>Temperature range: -40 ºC ~+70 ºC<br>Cycles: 2<br>Temperature cycling test dwell time: 12 hours | The change in attenuation coefficient shall be less than 0.05 dB/km. |
| **Other parameters** | According to **IEC 60794-1** | |

# 48F G.657 ADSS mini with minimum 50m span in medium load

## Scope

This Specification covers the design requirements and performance standard for the supply of optical fibre cable in the industry. A stable quality control system for the cable products through several programs including ISO 9001, ISO 14001 and OHS must be ensured.

| Cable type | Application |
|---|---|
| ADSS-SS-50m-48 | Self-supporting aerial installation |

## Reference

The cable offered must be designed, manufactured and tested according to the standards as follows:

| | |
|---|---|
| ITU-T G.657A1 | Characteristics of a single-mode optical fibre |
| IEC 60794-1-1 | Optical fibre cables-part 1-1: Generic specification-General |
| IEC 60794-1-2 | Optical fibre cables-part 1-2: Generic specification-Basic optical cable test procedure |
| IEC 60794-3 | Optical fibre cables-part 3: Sectional specification-Outdoor cables |
| IEC 60794-4-20 | Aerial optical cables along electrical power lines – Family specification for ADSS (All Dielectric Self Supported) optical cables |

## Life Time

Optical fibre cables offered in compliance with these specifications must be capable to withstand the typical service condition for a period of twenty-five (25) years without detriment to the operation characteristics of the cable.

## Application

| Item | Value |
|---|---|
| **Max. pole distance** | 50m |
| **Operation temperature** | -40 ºC～+70 ºC |
| **Storage temperature** | -40 ºC～+70 ºC |
| **Static bending radius** | 10 times the cable diameter |
| **Dynamic bending radius** | 20 times the cable diameter |

## Optical Fibre

Optical Fibres offered must meet the requirements of ITU-T G.657A1

| **Parameter** | **Specification** |
|---|---|
| MFD (1310nm) | 8.8±0.4□m |
| MFD (1550nm) | 9.8±0.5□m |
| Cladding diameter | 125±0.7□m |
| Fibre diameter | 245±5□m, with UV coating, and coloured to: 250±15□m |
| Core/cladding concentricity error | ≤ 0.5□m |
| Coating/cladding concentricity error | ≤ 12.0□m |
| Cladding non-circularity | ≤ 0.7% |
| Cut off wavelength | λcc ≤1260nm |
| Attenuation coefficient | 1310nm: 0.36dB/km max after cabling<br>1550nm: 0.22dB/km max after cabling |
| Bending-loss performance of optical fibres @1550nm | ≤0.25dB (10 turns around a mandrel of 30mm diameter) |
| Polarization mode dispersion maximum individual fibre | <=0.1ps/√km |
| Polarization mode dispersion link value | <=0,06ps/√km |
| Zero-dispersion wavelength | 1300~1324nm |
| Zero-dispersion slope | ≤0.092ps/nm$^2$·km |

## Optical Cable

### Technical Characteristics

- The second coating and stranding technology provide the fibres with enough space and bending endurance, which ensure good optical property of the fibres in the cable

- Accurate process control must ensure good mechanical and temperature performance
- High quality raw material must guarantee the long service life of cable

## Dimensions and Descriptions

The standard optical cable structure is shown in the following table:

| Item | Contents | Value |
|---|---|---|
| | | 48 |
| Structure | Type | 1+5 |
| Loose tube | Fiber count/tube | 12 |
| | Outer diameter (mm) | 2,4 |
| Central strength member | Material | FRP |
| | Diameter (mm) | 1,8 |
| | PE layer diameter (mm) | - |
| Water blocking | Material | Water blocking yarn & tape |
| Peripheral sthrength member | Material | Aramid yarn |
| Sheath | Material | HDPE |
| | Color | Black |
| | Thickness (mm) | Nominal: 1.5 |
| Ripcord | Number | 2 |
| Cable diameter(mm) MAXIMUM Approx. | | 10 |
| Cable weight(kg/km) MAXIMUM Approx. | | 100 |

## Mechanical Performance

Main mechanical performance

| Item | Max allowable tension(N) | Fibre strain (%) | Crush(N/100mm) | |
|---|---|---|---|---|
| | | | Short term | Long term |
| 48 | 2500 | □0.6 | 1500 | 750 |
| | 1800 | □0.33 | 1500 | 750 |

## Environmental Performance and installation condition

| Max. wind speed | Max. ice thickness | Initial Installation sag | Temperature |
|---|---|---|---|
| 17.5m/s | 6.5mm | 1.5% | -40 ºC～+70 ºC |

## Mechanical, Physical and Environmental Test Characteristics

The mechanical and environmental performance of the cable must be in accordance with the following table. Unless otherwise specified, all attenuation measurements required in this section shall be performed at 1550nm.

| Items | Test Method | Requirements |
|---|---|---|
| **Tension** | **IEC 60794-1-2-E1**<br>Load: According to 3.5<br>Sample length: Not less than 50m.<br>Duration time: 1min. | Additional attenuation: ≤0.05dB after test<br>No damage to outer jacket and inner elements |
| **Crush** | **IEC 60794-1-2-E3**<br>Load: According to 3.5<br>Duration of load: 1min | Additional attenuation: ≤0.05dB after test<br>No damage to outer jacket and inner elements |
| **Impact** | **IEC 60794-1-2-E4**<br>Radius: 300 mm<br>Impact energy: 10 J<br>Impact number: 1<br>Impact points: 3 | Additional attenuation: ≤0.1dB<br>No damage to outer jacket and inner elements |
| **Repeated bending** | **IEC 60794-1-2-E6**<br>Bending radius: 20*D<br>Cycles: 25<br>Load: 150N | Additional attenuation: ≤0.05dB<br>No damage to outer jacket and inner elements |
| **Torsion** | **IEC 60794-1-2-E7**<br>Cycles:10<br>Length under test: 1m<br>Turns: □ 180°<br>Load: 150N | Additional attenuation: ≤0.1dB<br>No damage to outer jacket and inner elements |
| **Water Penetration** | **IEC 60794-1-2-F5B**<br>Time: 24 hours<br>Sample length: 3m<br>Water height: 1m | No water leakage. |
| **Temperature cycling** | **IEC 60794-1-2-F1**<br>Sample length: at least 1000m<br>Temperature range: -40 ºC ~+70 ºC<br>Cycles: 2<br>Temperature cycling test dwell time: 12 hours | The change in attenuation coefficient shall be less than 0.05 dB/km. |
| **Other parameters** | According to **IEC 60794-1** | |

## 48F G.657 ADSS with minimum 80m span in heavy load

### Scope

This Specification covers the design requirements and performance standard for the supply of optical fibre cable in the industry. A stable quality control system for the cable products through several programs including ISO 9001, ISO 14001 and OHS must be ensured.

| Cable type | Application |
|---|---|
| ADSS-SS-80m-48 | Self-supporting aerial installation |

80m represent the span.

## Reference

The cable offered must be designed, manufactured and tested according to the standards as follows:

| | |
|---|---|
| ITU-T G.657A1 | Characteristics of a single-mode optical fibre |
| IEC 60794-1-1 | Optical fibre cables-part 1-1: Generic specification-General |
| IEC 60794-1-2 | Optical fibre cables-part 1-2: Generic specification-Basic optical cable test procedure |
| IEC 60794-3 | Optical fibre cables-part 3: Sectional specification-Outdoor cables |
| IEC 60794-4-20 | Aerial optical cables along electrical power lines – Family specification for ADSS (All Dielectric Self Supported) optical cables |

## Life Time

Optical fibre cables offered in compliance with these specifications must be capable to withstand the typical service condition for a period of twenty-five (25) years without detriment to the operation characteristics of the cable.

## Application

| **Item** | **Value** |
|---|---|
| **Max. pole distance** | 80m |
| **Operation temperature** | -40 ºC～+70 ºC |
| **Storage temperature** | -40 ºC～+70 ºC |
| **Static bending radius** | 10 times the cable diameter |
| **Dynamic bending radius** | 20 times the cable diameter |

## Optical Fibre

Optical Fibres offered must meet the requirements of ITU-T G.657A1

| **Parameter** | **Specification** |
|---|---|
| MFD (1310nm) | 8.8±0.4□m |
| MFD (1550nm) | 9.8±0.5□m |
| Cladding diameter | 125±0.7□m |
| Fibre diameter | 245±5□m, with UV coating, and coloured to: 250±15□m |
| Core/cladding concentricity error | ≤ 0.5□m |
| Coating/cladding concentricity error | ≤ 12.0□m |
| Cladding non-circularity | ≤ 0.7% |

| | |
|---|---|
| Cut off wavelength | λcc ≤1260nm |
| Attenuation coefficient | 1310nm: 0.36dB/km max after cabling<br>1550nm: 0.22dB/km max after cabling |
| Bending-loss performance of optical fibres @1550nm | ≤0.25dB (10 turns around a mandrel of 30mm diameter) |
| Polarization mode dispersion maximum individual fibre | <=0.1ps/√km |
| Polarization mode dispersion link value | <=0,06ps/√km |
| Zero-dispersion wavelength | 1300~1324nm |
| Zero-dispersion slope | ≤0.092ps/nm$^2$·km |

# Optical Cable

## Technical Characteristics

- The second coating and stranding technology provide the fibres with enough space and bending endurance, which ensure good optical property of the fibres in the cable
- Accurate process control ensures good mechanical and temperature performance
- High quality raw material guarantees the long service life of cable

## Dimensions and Descriptions

The standard optical cable structure is shown in the following table:

| **Item** | **Contents** | **Value** |
|---|---|---|
| | | **48** |
| Structure | Type | 1+5 |
| Loose tube | Fibre count/tube | 12 |
| | Outer diameter (mm) | 2,4 |
| Central strength member | Material | FRP |
| | Diameter (mm) | 1,8 |
| | PE layer diameter (mm) | - |
| Water blocking | Material | Water blocking yarn & tape |
| Peripheral strength member | Material | Aramid yarn |
| Sheath | Material | HDPE |
| | Colour | Black |
| | Thickness (mm) | Nominal: 1.5 |

| | | |
|---|---|---|
| Ripcord | Number | 2 |
| Cable diameter(mm) Approx. | | up to 12 |
| Cable weight(kg/km) Approx. | | up to 120 |

## Mechanical Performance

Main mechanical performance

| Item | Max allowable tension(N) | Fibre strain (%) | Crush(N/100mm) | |
|---|---|---|---|---|
| | | | Short term | Long term |
| 48 | 4000 | □0.33 | 1500 | 750 |
| | 5500 | □0.6 | 1500 | 750 |

## Environmental performance and installation condition

| Max. wind speed | Max. ice thickness | Initial Installation sag | Temperature |
|---|---|---|---|
| 17.7m/s | 12.5 | 1.5% | -40 ºC～+70 ºC |

## Mechanical, Physical and Environmental Test Characteristics

The mechanical and environmental performance of the cable must be in accordance with the following table. Unless otherwise specified, all attenuation measurements required in this section shall be performed at 1550nm.

| Items | Test Method | Requirements |
|---|---|---|
| **Tension** | **IEC 60794-1-2-E1**<br>Load: According to 3.5<br>Sample length: Not less than 50m.<br>Duration time: 1min. | Additional attenuation: ≤0.05dB after test<br>No damage to outer jacket and inner elements |
| **Crush** | **IEC 60794-1-2-E3**<br>Load: According to 3.5<br><br>Duration of load: 1min | Additional attenuation: ≤0.05dB after test<br>No damage to outer jacket and inner elements |
| **Impact** | **IEC 60794-1-2-E4**<br>Radius: 300 mm<br>Impact energy: 10 J<br>Impact number: 1<br>Impact points: 3 | Additional attenuation: ≤0.1dB<br>No damage to outer jacket and inner elements |
| **Repeated bending** | **IEC 60794-1-2-E6**<br>Bending radius: 20*D<br>Cycles: 25<br>Load: 150N | Additional attenuation: ≤0.05dB<br>No damage to outer jacket and inner elements |

| | | |
|---|---|---|
| **Torsion** | **IEC 60794-1-2-E7**<br>Cycles:10<br>Length under test: 1m<br>Turns: □ 180°<br>Load: 150N | Additional attenuation: ≤0.1dB<br>No damage to outer jacket and inner elements |
| **Water Penetration** | **IEC 60794-1-2-F5B**<br>Time: 24 hours<br>Sample length: 3m<br>Water height: 1m | No water leakage. |
| **Temperature cycling** | **IEC 60794-1-2-F1**<br>Sample length: at least 1000m<br>Temperature range: -40 ºC ~+70 ºC<br>Cycles: 2<br>Temperature cycling test dwell time: 12 hours | The change in attenuation coefficient shall be less than 0.05 dB/km. |
| **Other parameters** | According to **IEC 60794-1** | |

# 96F G.657 ADSS with minimum 80m span in heavy load

## Scope

This Specification covers the design requirements and performance standard for the supply of optical fibre cable in the industry. A stable quality control system for the cable products through several programs including ISO 9001, ISO 14001 and OHS must be ensured.

| Cable type | Application |
|---|---|
| ADSS-SS-80m-96 | Self-supporting aerial installation |

80m represent the span.

## Reference

The cable offered must be designed, manufactured and tested according to the standards as follows:

| | |
|---|---|
| ITU-T G.657A1 | Characteristics of a single-mode optical fibre |
| IEC 60794-1-1 | Optical fibre cables-part 1-1: Generic specification-General |
| IEC 60794-1-2 | Optical fibre cables-part 1-2: Generic specification-Basic optical cable test procedure |
| IEC 60794-3 | Optical fibre cables-part 3: Sectional specification-Outdoor cables |
| IEC 60794-4-20 | Aerial optical cables along electrical power lines – Family specification for ADSS (All Dielectric Self Supported) optical cables |

## Life Time

Optical fibre cables offered in compliance with these specifications must be capable to withstand the typical service condition for a period of twenty-five (25) years without detriment to the operation characteristics of the cable.

## Application

| Item | Value |
|---|---|
| **Max. pole distance** | 80m |
| **Operation temperature** | -40 ºC～+70 ºC |
| **Storage temperature** | -40 ºC～+70 ºC |
| **Static bending radius** | 10 times the cable diameter |
| **Dynamic bending radius** | 20 times the cable diameter |

## Optical Fibre

Optical Fibres offered must meet the requirements of ITU-T G.657A1

| Parameter | Specification |
|---|---|
| MFD (1310nm) | 8.8±0.4□m |
| MFD (1550nm) | 9.8±0.5□m |
| Cladding diameter | 125±0.7□m |
| Fibre diameter | 245±5□m, with UV coating, and coloured to: 250±15□m |
| Core/cladding concentricity error | ≤ 0.5□m |
| Coating/cladding concentricity error | ≤ 12.0□m |
| Cladding non-circularity | ≤ 0.7% |
| Cut off wavelength | λcc ≤1260nm |
| Attenuation coefficient | 1310nm: 0.36dB/km max after cabling<br>1550nm: 0.22dB/km max after cabling |
| Bending-loss performance of optical fibres @1550nm | ≤0.25dB (10 turns around a mandrel of 30mm diameter) |
| Polarization mode dispersion maximum individual fibre | <=0.1ps/√km |
| Polarization mode dispersion link value | <=0,06ps/√km |
| Zero-dispersion wavelength | 1300~1324nm |
| Zero-dispersion slope | ≤0.092ps/nm$^2$·km |

# Optical Cable

## Technical Characteristics

- The second coating and stranding technology provide the fibres with enough space and bending endurance, which ensure good optical property of the fibres in the cable
- Accurate process control ensures good mechanical and temperature performance
- High quality raw material guarantees the long service life of cable

## Dimensions and Descriptions

The standard optical cable structure is shown in the following table:

| **Item** | **Contents** | **Value** |
|---|---|---|
| | | **96** |
| Structure | Type | 1+5 |
| Loose tube | Fibre count/tube | 12 |
| | Outer diameter (mm) | 2,4 |
| Central strength member | Material | FRP |
| | Diameter (mm) | 1,8 |
| | PE layer diameter (mm) | - |
| Water blocking | Material | Water blocking yarn & tape |
| Peripheral strength member | Material | Aramid yarn |
| Sheath | Material | HDPE |
| | Colour | Black |
| | Thickness (mm) | Nominal: 1.5 |
| Ripcord | Number | 2 |
| Cable diameter(mm) MAXIMUM Approx. | | up to 14 |
| Cable weight(kg/km) MAXIMUM Approx. | | up to 140 |

## Mechanical Performance

Main mechanical performance

| **Item** | **Max allowable tension(N)** | **Fibre strain (%)** | **Crush(N/100mm)** | |
|---|---|---|---|---|
| | | | **Short term** | **Long term** |
| 48 | 4000 | □0.33 | 1500 | 750 |
| | 5500 | □0.6 | 1500 | 750 |

## Environmental performance and installation condition

| **Max. wind speed** | **Max. ice thickness** | **Initial Installation sag** | **Temperature** |
|---|---|---|---|

| | | | |
|---|---|---|---|
| 17.7m/s | 12.5 | 1.5% | -40 ºC～+70 ºC |

## Mechanical, Physical and Environmental Test Characteristics

The mechanical and environmental performance of the cable must be in accordance with the following table. Unless otherwise specified, all attenuation measurements required in this section shall be performed at 1550nm.

| Items | Test Method | Requirements |
|---|---|---|
| **Tension** | **IEC 60794-1-2-E1**<br>Load: According to 3.5<br>Sample length: Not less than 50m.<br>Duration time: 1min. | Additional attenuation: ≤0.05dB after test<br>No damage to outer jacket and inner elements |
| **Crush** | **IEC 60794-1-2-E3**<br>Load: According to 3.5<br>Duration of load: 1min | Additional attenuation: ≤0.05dB after test<br>No damage to outer jacket and inner elements |
| **Impact** | **IEC 60794-1-2-E4**<br>Radius: 300 mm<br>Impact energy: 10 J<br>Impact number: 1<br>Impact points: 3 | Additional attenuation: ≤0.1dB<br>No damage to outer jacket and inner elements |
| **Repeated bending** | **IEC 60794-1-2-E6**<br>Bending radius: 20*D<br>Cycles: 25<br>Load: 150N | Additional attenuation: ≤0.05dB<br>No damage to outer jacket and inner elements |
| **Torsion** | **IEC 60794-1-2-E7**<br>Cycles:10<br>Length under test: 1m<br>Turns: ± 180°<br>Load: 150N | Additional attenuation: ≤0.1dB<br>No damage to outer jacket and inner elements |
| **Water Penetration** | **IEC 60794-1-2-F5B**<br>Time: 24 hours<br>Sample length: 3m<br>Water height: 1m | No water leakage. |
| **Temperature cycling** | **IEC 60794-1-2-F1**<br>Sample length: at least 1000m<br>Temperature range: -40 ºC ~+70 ºC<br>Cycles: 2<br>Temperature cycling test dwell time: 12 hours | The change in attenuation coefficient shall be less than 0.05 dB/km. |
| **Other parameters** | According to **IEC 60794-1** | |

# 12/24/48/72/96/144/216/288 G.657 mini to be blown in pipes of 12mm internal profile

## Scope

This specification covers the design and performance of the single mode optical cables to be used in air blown micro duct application.

## Cable Description

- 12/24/48/72/96/144/216/288 G.657A1 SM-fibres.
- Loose tubes SZ-stranded.
- Suitable for air blown installation in micro-duct.

## Quality

A stable quality control system for the cable products through several programs including ISO 9001, ISO 14001 and OHS must be ensured.

## Reliability

The supplier must ensure product reliability through rigorous qualification testing of each product family. Both initial and periodic qualification testing must be performed to assure the cable's performance and durability in the field environment.

## Reference

| | |
|---|---|
| ITU-T G.657A1 | Characteristics of a single-mode optical fibre |
| IEC 60794-1-1 | Optical fibre cables- part1-1-Generic specification-General |
| IEC 60794-1-2 | Optical fibre cables- part1-2-Generic specification-Basic optical cable test procedure |
| IEC 60794-3 | Optical fibre cables- part3-Sectional specification- Outdoor cables |
| IEC 60794-5 | Optical fibre cables- part5-Sectional specification- Microduct cabling for installation by blowing |

## Working Condition

- Transportation and storage temperature: -30℃～+70℃
- Installation temperature: -10℃～+50℃
- Operation temperature: -30℃～+70℃

## Minimum Allowable Bending Radius

- Static: 10D
- Dynamic: 20D

D is the out diameter of the cable

## Life Time

Optical fibre cables offered in compliance with the specifications must withstand the typical service condition for a period of twenty-five (25) years without detriment to the transmission or operation and maintenance characteristics of the cable.

## Optical Fibre

Optical Fibres offered must meet the requirements of ITU-T G.657A1

| **Parameter** | **Specification** |
|---|---|
| MFD (1310nm) | 8.8±0.4□m |
| MFD (1550nm) | 9.8±0.5□m |
| Cladding diameter | 125±0.7□m |
| Fibre diameter | 245±5□m, with UV coating, and coloured to: 250±15□m<br>200□m option for 144 to 288 fibre cable |
| Core/cladding concentricity error | ≤ 0.5□m |
| Coating/cladding concentricity error | ≤ 12.0□m |
| Cladding non-circularity | ≤ 0.7% |
| Cut off wavelength | λcc ≤1260nm |
| Attenuation coefficient | 1310nm: 0.36dB/km max after cabling<br>1550nm: 0.22dB/km max after cabling |
| Bending-loss performance of optical fibres @1550nm | ≤0.25dB (10 turns around a mandrel of 30mm diameter) |
| Polarization mode dispersion maximum individual fibre | <=0.1ps/√km |
| Polarization mode dispersion link value | <= 0,06ps/√km |
| Zero-dispersion wavelength | 1300~1324nm |
| Zero-dispersion slope | ≤0.092ps/nm$^2$·km |

## Optical Cable

### General Design

- Optical fibres must be housed in loose tubes that are made of high-modulus plastic and filled with waterproof compounds.
- FRP must be applied as central strength member.
- Loose tubes must be SZ-stranded around the strength member.
- Water blocking yarns must be used in and over the cable core to prevent it from water ingress.
- Polyethylene sheath must be applied over the cable core as the outer sheath.

### Dimensions and Descriptions of Cable Construction

| **Item** | **Contents** | **Value** | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **12** | **24** | **48** | **72** | **96** | **144** | | **216** | | **288** | |
| Loose tube | Number | 1 | 2 | 4 | 6 | 8 | 12 | 6 | 18 | 9 | 24 | 12 |
| | Outer diameter ±0.1mm | 1.45 | | | | | | | | | | |
| Filler | Number | 5 | 4 | 2 | 0 | 0 | 0 | | 0 | | 0 | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Fibre counts per tube | G.657A1 | 12 | 12 | 24 | 12 | 24 | 12 | 24 |
| Central strength member | Material | FRP | | | | | | |
| | Diameter (mm) | 1.6 | 2.4 | 2.4 | 1.6 | | 2,8 | |
| | Diameter of PE lay | / | / | 4.1 | / | | / | |
| Outer sheath | Material | HDPE | | | | | | |
| | Colour | Black | | | | | | |
| | Thickness | Approx.0.5 | | | | | | |
| | (mm) | | | | | | | |
| Cable diameter(±0.2mm) | | 5.4 | 6.1 | 7 | 8,5 | | 9 | |
| For micro –duct inside (mm) | | 8～12 | 8～12 | 10～12 | 12 | | 12 | |
| Max. Tensile strength (N) | | 600 | 800 | | 600 | | 1000 | |
| Crush(N/100mm) | | Short term: 500 Long term: 200 | | | | | | |
| Cable weight(kg/km) Approx. | | 26 | 36 | 52 | | | 80 | |

The supplier can offer thicker 216 and/or 288 fibre cable, but must submit exact installation rules, which allow the air blowing of the cable in a PEHD pipe of 12mm internal diameter to a distance greater than 1km! Same rule goes for the 144 fibre cable, in relation to a 10mm internal diameter PEHD pipe.

## Mechanical, Physical and Environmental Test Characteristics

The finished cables must be subjected to the following mechanical conditions.

| **Item** | **Test Method** | **Requirements** |
|---|---|---|
| Tensile performance | IEC 60794-1-2-E1<br>Load: according to short term tensile described in 3.2.2<br>Cable length under tension: Not less than 50m.<br>Duration of load sustain: 1min.<br>Velocity of transfer device: 10mm/min | The maximum fibre strain less than 0.6% under maximum tensile short-term load. The maximum increase in attenuation less than 0.1dB.<br>No change in attenuation after test at 1550nm. Under visual examination without magnification, no damage to the sheath or to the cable elements after test. |
| Crush | IEC 60794-1-2-E3<br>Load: 500N<br>Duration of load: 1min | No change in attenuation after test at 1550nm. Under visual examination without magnification, no damage to the sheath or to the cable elements. The imprint of the striking surface on the sheath is not considered mechanical damage. |

| | | |
|---|---|---|
| Bend | IEC 60794-1-2-E11A<br>Mandrel radius: 10 times cable diameter Turns:10<br>Cycles:5 | No change in attenuation at 1550nm after test. Under visual examination without magnification, no damage to the sheath or to the cable elements. |
| Repeated bending | IEC 60794-1-2-E6<br>Bending radius: 20 times cable diameter Cycles: 25<br>Load: 25N<br>Duration of cycle: Approximately 2s. | No change in attenuation at 1550nm after test. Under visual examination without magnification, no damage to the sheath or to the cable elements. |
| Torsion | IEC 60794-1-2-E7<br>Cycles: 5<br>Length under test: 1m<br>Turns: ±180°<br>Load: 40N | The variation on attenuation for each fibre less than 0.05dB at 1550nm<br>Under visual examination without magnification, no damage to the sheath or to the cable elements.<br>No permanent change in attenuation after test. |
| Temperature cycling | IEC 60794-1-2-F1<br>Sample length: at least 1000m<br>Temperature range: -30℃～+70℃<br>Cycles: 2<br>Temperature cycling test dwell time: 12 hours | There is no change in attenuation coefficient at 1550nm after the test. |
| Water Penetration | IEC 60794-1-2-F5B<br>Time: 24 hours<br>Sample length: 3m<br>Water height: 1m | No water leakage |
| Compound flow | IEC 60794-1-2-E14<br>Sample count: 5<br>Sample length:300 ±5 mm,<br>Remove length: 130 ±2,5 mm,<br>Time:24h | No filling compound dripped. |
| Other parameters | According to IEC 60794, YD/T 1460.4-2006 | |

Remark: “No attenuation changes” is considered as the attenuation changes ≤ 0.05 dB.

### Environmental and installation condition

- Transportation and storage temperature: -30℃～+70℃
- Installation temperature: -10℃～+50℃
- Operation temperature: -30℃～+70℃

## Color Code and Cable Sheath marking

## Color Code of Fibres

Standards: DIN VDE 0888 & IEC 60304

Fiber in tubes

| *fiber ord. no* | *color* | *CAD color* | *fiber ord. no* | *color* | *CAD color* |
|---|---|---|---|---|---|
| **1** | **red** | red | **13** | **red -** | red - |
| **2** | **green** | green | **14** | **green -** | green - |
| **3** | **blue** | blue | **15** | **blue -** | blue - |
| **4** | **yellow** | yellow | **16** | **yellow -** | yellow - |
| **5** | **white** | 9 | **17** | **white -** | 9 - |
| **6** | **grey** | 8 | **18** | **grey -** | 8 - |
| **7** | **brown** | 42 | **19** | **brown -** | 42 - |
| **8** | **violet** | magenta | **20** | **violet -** | magenta - |
| **9** | **agua** | cyan | **21** | **agua -** | cyan - |
| **10** | **black** | white/black | **22** | **dark green** | 72 |
| **11** | **orange** | 40 | **23** | **orange -** | 40 - |
| **12** | **pink** | 11 | **24** | **pink -** | 11 - |

Tubes in cable

| *tube ord. no* | *color* | *CAD color* |
|---|---|---|
| **1** | **red** | red |
| **2** | **green** | green |
| **3** | **blue** | blue |
| **4** | **yellow** | yellow |
| **5** | **white** | 9 |
| **6** | **grey** | 8 |
| **7** | **brown** | 42 |
| **8** | **violet** | magenta |
| **9** | **agua** | cyan |
| **10** | **black** | white/black |
| **11** | **orange** | 40 |
| **12** | **pink** | 11 |

## Cable sheath marking

Color of printing: white

- Contents: RUNE, year of manufacturing, DIN cable name, Fibre count x SM 9/125 <fibre type> cable number // meter marking
- Interval: 1±0.2% m
- Outer sheath marking legend can be changed according to user's requests.
- 4F ADSS does not need consecutive meter markings.